



Guidelines for Policies on Sudden Cardiac Arrest Prevention in Student-Athletes

Senate Bill 463, the 2020 General Assembly
Code of Virginia § 22.1-271.8

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by the Virginia Board of Education

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Virginia Board of Education

Guidelines for Policies on Sudden Cardiac Arrest Prevention in Student-Athletes

Introduction

The purpose of the Virginia Board of Education *Guidelines for Policies on Sudden Cardiac Arrest Prevention in Student-Athletes* is to protect student-athletes by providing recommendations that support the development and implementation of effective sudden cardiac arrest (SCA) prevention policies in local school divisions through education, prompt recognition, and appropriate response. Sudden cardiac arrest is a sudden loss of heart function most frequently caused by an abnormality in the heart's electrical system and is different from a heart attack which involves a blockage in a blood vessel to the heart. While rare, SCA is the leading medical cause of death in young athletes. Hence, raising awareness of warning signs and risk factors, putting a strong cardiac emergency action plan in place, and screening for heart conditions are key as SCA is often prevented when the underlying causes are diagnosed and treated.

Pursuant to [Senate Bill 463](#), (2020), the *Code of Virginia* was amended to include [§ 22.1-271.8](#) directing the Board of Education to develop, biennially update, and distribute to school divisions guidelines on policies to inform and educate coaches, student-athletes, and student-athletes' parents or guardians about the nature and risk of SCA, procedures for removal from and return to play, and the risks of not reporting symptoms. A student-athlete who is removed from play shall not return to play until he/she is evaluated by and receives written clearance to return to physical activity by an appropriate licensed health care provider as determined by the Board of Education. The licensed health care provider evaluating student-athletes may be a volunteer. The guidelines shall also be posted on the Department of Education's website.

The goals of [Senate Bill 463](#) are to ensure that student-athletes who may be at increased risk of SCA are properly identified, promptly removed from activity, and not allowed to return to play until evaluated by an appropriate licensed health care provider familiar with evidence-based best practices for diagnosing and treating various forms of heart disease and individualizing care. Proper identification requires awareness of the warning signs of SCA, which are often ignored or attributed to other causes. Early recognition and intervention are well-proven measures in the chain of survival for cardiac events. Any delays in taking appropriate action can be catastrophic. Training parents, students, and coaches to respond to an SCA emergency could help save a life.

Exercise is one of the most powerful tools for improving health overall. Yet, for a small number of students with cardiac conditions, exercise can sometimes be associated with the risk of sudden death. The underlying causes of SCA can generally be placed into three broad categories: structural/functional, electrical, and other. Some factors that may increase the risk of SCA include

- structural/functional causes including Hypertrophic Cardiomyopathy (HCM), coronary artery anomalies, or myocarditis;
- electrical causes including conditions such as Long QT Syndrome, Wolff-Parkinson-White syndrome, ventricular fibrillation, and other types of arrhythmias that cause the heart to beat with an irregular or inefficient rhythm;

- the use of drugs, such as cocaine, inhalants, “recreational” drugs, excessive energy drinks, diet pills, performance enhancing supplements, and some prescription medications;
- other causes including blunt force trauma to the chest (commotio cordis);
- family history of known heart abnormalities, sudden death before 50, some auto-immune disorders, sickle cell trait or sickle cell disease.

Many of the conditions are known to be genetic and can be hard to identify or diagnose through routine examination. Accordingly, an annual pre-participation physical examination, including a detailed personal and family medical history, is critical to identifying potential causes of SCA. When screening for genetic or congenital cardiovascular abnormalities, the American Heart Association (AHA) recommends physicians use the AHA's 14-point screening guidelines, as well as those from other societies (e.g., preparticipation physical evaluation (PPE) from the American Academy of Pediatrics), combined with a history and physical examination.

Although SCA happens unexpectedly, up to 72 percent of SCAs are preceded by symptoms, which often go unrecognized, unreported, missed, or misdiagnosed. Parents, student athletes, and coaches are often unaware of the warning signs that may include:

- unexplained fainting during or right after exercise
- fainting with excitement or when startled
- chest pain or discomfort with exercise
- excessive shortness of breath during exercise
- racing or fluttering heart palpitations or irregular heartbeat
- dizziness or lightheadedness
- extreme unexpected fatigue during or after exercise

Signs and symptoms of SCA are often ignored or attributed to other causes such as physical exhaustion, being out of shape, stress, heat, or lack of food or water. Additionally, students (or their parents) may withhold information because they do not want to jeopardize playing time. Moreover, families may not know, or may not report, heart health history or warning signs to a licensed health care provider who is experienced in evaluating cardiovascular conditions.

A student-athlete reporting any warning signs of SCA should be removed immediately from activity and referred for further evaluation. When SCA happens, the student collapses, may breathe abnormally and becomes unresponsive. Although the student may gasp for breath and have seizure-like movements, the student’s heart has stopped. Sudden cardiac arrest leads to death if not treated within minutes and is fatal in 92 percent of cases. Survival depends on immediately activating EMS/calling 911, starting cardiopulmonary resuscitation (CPR), and using an Automated External Defibrillator (AED) if available. CPR can triple the chance of survival. CPR/AED/first aid hands-on training is a graduation requirement for high school students; a licensure requirement for public school teachers and administrators; and a Virginia High School League (VHSL) coaches’ education requirement for athletic coaches. Having an AED nearby is critical, as defibrillation with an AED is the only effective treatment to restore normal electrical activity and get the heart back into a normal rhythm. An AED is also life saving for ventricular fibrillation caused by a blow to the chest over the heart (commotio cordis). Establishing effective resuscitation protocols that include a dedicated emergency action plan

(EAP) and increasing the availability of AEDs in competitive sport settings are the most effective strategies in improving the outcome of sudden cardiac death among student-athletes. Additionally, these protocols may also be effective in the event of medical emergencies involving individuals other than student-athletes, including coaches, team staff, game officials, and spectators, who may suffer cardiac arrest at the athletic venue.

Definitions

Automated External Defibrillator (AED) is a medical device designed to analyze heart rhythm and, if appropriate, deliver an electrical shock to individuals experiencing ventricular fibrillation (a type of arrhythmia) in an effort to restore a normal heart rhythm.

Sudden cardiac arrest (SCA) is a medical emergency that occurs when the heart stops beating effectively. A host of factors including electrical or structural problems in the heart can cause sudden cardiac arrest. Many of the causes of cardiac arrest are not recognized or diagnosed until the individual begins to experience adverse symptoms.

Cardiopulmonary Resuscitation (CPR) is an emergency, life-saving procedure performed when someone's heart stops beating.

Commotio cordis describes a rare phenomenon in which blunt trauma to the chest causes an abnormal heart rhythm (ventricular fibrillation) that can lead to SCA.

Emergency action plan (EAP) is a written document outlining emergency response procedures specific to the athletic venue.

Heart attack is a medical emergency that occurs when blood flow to the heart is stopped due to a blockage in an artery supplying blood to the heart. This lack of blood flow causes heart muscle tissue to die which can lead to cardiac arrest.

Appropriate licensed health care provider is a physician (i.e., M.D., D.O.) licensed by the Virginia Board of Medicine or a nurse practitioner licensed by the Virginia State Board of Nursing who is experienced in evaluating cardiovascular conditions.

Virginia Board of Education Guidelines

Policies and Procedures

1. Each school division shall develop and biennially update policies and procedures regarding the identification of student-athletes at increased risk of SCA and comprehensive management of student-athletes who may be experiencing SCA.
2. In order to participate in any extracurricular athletic activity, each student-athlete and the student-athlete's parent or guardian shall review, on an annual basis, information provided by the school division on signs and symptoms of SCA and the risks of not reporting those symptoms. After reviewing these materials, each student-athlete and the student-athlete's parent or guardian shall sign a statement acknowledging receipt, review, and understanding of such information. The local school division will determine procedures for ensuring, annually, that statements are distributed to and collected from each student-athlete and his or her parent or guardian with appropriate signatures prior to participation.

3. Sudden cardiac arrest education programs may include, but are not limited to:
 - The importance of early recognition and prompt response to a student displaying signs and symptoms associated with SCA is critical.
 - Common signs and symptoms indicating increased risk of SCA include unexplained collapse/fainting; unexplained shaking, convulsions or tremors (seizure-like movement); unexplained shortness of breath; feeling that the heart is racing or “beating out of the chest;” chest pain; unexplained dizziness; and/or extreme fatigue.
 - Individuals experiencing signs or symptoms indicating increased risk of SCA are encouraged to immediately report these signs or symptoms to a coach, athletic trainer, parent, or other adult. Failure to do so may delay the medical evaluation of the student-athlete, losing the opportunity for medical intervention to avoid SCA. The primary risk of not reporting these signs or symptoms is experiencing sudden cardiac arrest (SCA) with resulting death or disability.
 - Students who continue to play while experiencing potential signs or symptoms of cardiac arrest may experience SCA.
4. A student-athlete reporting any of the signs or symptoms associated with SCA to a coach, athletic trainer, or team physician in a practice or game shall be immediately removed from the activity. A student-athlete who has been removed from play, evaluated, and suspected to be at risk of or experiencing SCA shall not return to play that same day nor until (i) evaluated by an appropriate licensed health care provider as defined by the Board of Education and (ii) in receipt of written clearance to return to play from such licensed health care provider. The licensed health care provider evaluating student-athletes may be a volunteer.

Prevention

Sudden cardiac arrest occurs without warning in many instances. Preventing SCA in student-athletes begins with an annual pre-participation exam intended to identify any underlying medical conditions that may predispose a student to SCA and/or students who may be at risk for SCA based on family medical history. Preventing SCA also requires that student-athletes and their families be familiar with the warning signs of SCA and understand the importance of reporting the presence of any warning signs to a coach, athletic trainer, parent/guardian and/or family medical provider.

Recognition

Signs of increased risk of SCA:

- **Unexplained shortness of breath**—student-athletes who are temporarily short of breath and do not recover quickly, or always seem out of breath, could be experiencing SCA.
- **Heart is racing/pounding/”beating out of their chest”**—a student-athlete’s heart that is beating fast at the wrong time (like when sitting on the bench), may be a sign of SCA.
- **Chest pain/tightness/pressure**—student-athletes reporting chest pain, tightness, or pressure should be evaluated.
- **Extreme fatigue**—student-athletes should be tired after a practice or game, but if they are always more fatigued than others on the team, this could be a sign of SCA.
- **Dizziness**—student-athletes who repeatedly report feeling dizzy may be experiencing SCA.

Signs of actual SCA events:

- **Unexplained collapse/fainting is the #1 warning sign of SCA**—student-athletes who are unresponsive should be assumed to be in SCA until proven otherwise—don't assume the student-athletes passed out because they are out of shape or it resulted from heat, dehydration, or exhaustion.
- **Unexplained gasping, convulsions or tremors**—brief seizure-like activity is common in athletes with SCA.

Management

Emergency Action Plan (EAP)

Emergencies will inevitably occur in settings where practices and athletic competitions take place. Schools sponsoring athletic programs should have Emergency Action Plans (EAPs) that include the people involved in providing emergency care and procedures to follow specific to the athletic location and activity. EAPs are intended to ensure site-specific protocols are developed to help staff prepare and practice for a wide variety of emergencies that may occur during athletic participation. Ideally, the creation of the EAP is a collaborative effort between all individuals (e.g., administrators, athletic trainers, local EMS, school health staff) involved in the care of student-athletes, coaches, officials, school staff, and spectators requiring an emergency response. Advanced planning for SCA can save valuable time as the EAP typically identifies the location of the AED nearest to each athletic practice or competition facility and may provide a list of individuals trained to provide CPR. Included in the Appendix is an EAP template developed by the VHSL to help schools create this important tool.

Immediate Response to a Life-Threatening Situation

Following is a general overview of time-critical emergency best practices to address a life-threatening emergency like SCA. If an individual collapses unexpectedly and is unresponsive:

- Activate EMS/call 911.
- Begin CPR—keeps blood circulating through the body until help arrives.
- Retrieve an AED—delivers an electrical shock to the heart if needed. Designed to be used by untrained bystanders; AEDs have pictures and voice instructions to help people use the device. Schools are encouraged to have an AED accessible during athletic activities as decreasing the time interval to defibrillation is one of the most important priorities to improve survival in sudden cardiac arrest.

Response to Non-Life-Threatening Situation

If a student-athlete reports experiencing any of the warning signs of SCA:

- Remove the student-athlete from play and monitor for worsening symptoms.
- Refer the student-athlete for further evaluation by a medical professional.
- The student-athlete **MAY NOT** return to participation without written clearance to do so from an appropriate licensed health care provider as determined by the Board of Education.

Code of Virginia

§ 22.1-271.8. Sudden cardiac arrest prevention in student-athletes.

A. The Board of Education shall develop, biennially update, and distribute to each local school division guidelines on policies to inform and educate coaches, student-athletes, and student-athletes' parents or guardians about the nature and risk of sudden cardiac arrest, procedures for removal from and return to play, and the risks of not reporting symptoms. The guidelines shall also be posted on the Department's website.

B. Each local school division shall develop and biennially update policies and procedures regarding the identification and handling of symptoms that may lead to sudden cardiac arrest in student-athletes. Such policies shall:

1. Require that in order to participate in any extracurricular physical activity, each student-athlete and the student-athlete's parent or guardian shall review, on an annual basis, information provided by the local school division on symptoms that may lead to sudden cardiac arrest. After reviewing the materials, each student-athlete and the student-athlete's parent or guardian shall sign a statement acknowledging receipt of such information, in a manner approved by the Board of Education.

2. Require that a student-athlete who is experiencing symptoms that may lead to sudden cardiac arrest be immediately removed from play. A student-athlete who is removed from play shall not return to play until he is evaluated by and receives written clearance to return to physical activity by an appropriate licensed health care provider as determined by the Board of Education. The licensed health care provider evaluating student-athletes may be a volunteer.

Resources

- American Academy of Family Physicians (AAFP) Pre-Participation Physical Evaluation Monograph [HTTPS://WWW.AAFP.ORG/FAMILY-PHYSICIAN/PATIENT-CARE/CARE-RESOURCES/PHYSICAL-SAFETY/PRE-PARTICIPATION-PHYSICAL-EVALUATION-MONOGRAPH.HTML](https://www.aafp.org/family-physician/patient-care/care-resources/physical-safety/pre-participation-physical-evaluation-monograph.html)
- American Academy of Pediatrics (AAP) Pre participation Physical Evaluation (PPE) <https://www.aap.org/en/patient-care/preparticipation-physical-evaluation/>
- American Academy of Pediatrics (AAP) Sudden Cardiac Death: A Pediatrician's Role (SCD) <https://publications.aap.org/pediatricsinreview/article-abstract/40/9/456/35325/Sudden-Cardiac-Death-A-Pediatrician-s-Role?redirectedFrom=fulltext>
- American Heart Association (AHA) Heart Attack and Stroke Symptoms <https://www.heart.org/>
- British Journal of Sports Medicine (BMJ) <https://bjsm.bmj.com/content/55/21/1196.full>
- Simon's Heart (SH) Heart Screening <https://simonsheart.org/>
- American Red Cross (ARC) Heart Attack and Stroke Symptoms <https://www.redcross.org/>
- Sports Medicine – Open Immediate Bystander Cardiopulmonary Resuscitation to Sudden Cardiac Arrest during Sports is Associated with Improved Survival—a Video Analysis <https://sportsmedicine-open.springeropen.com/articles/10.1186/s40798-021-00346-2>
- Korey Stringer Institute (UCONN) Automated External Defibrillators <https://ksi.uconn.edu/prevention/automated-external-defibrillators/>
- Korey Stringer Institute (UCONN) Emergency Action Plans <https://ksi.uconn.edu/prevention/emergency-action-plans/>
- Korey Stringer Institute (UCONN) Sudden Cardiac Death (<https://ksi.uconn.edu/emergency-conditions/cardiac-Conditions/sudden-cardiac-death/>)
- National Federation of State High School Associations (NFHS) Sudden Cardiac Arrest <https://nfhslearn.com/courses/sudden-cardiac-arrest>
- Preparticipation Screening for CVD in Competitive Athletes: Recommendations from the AHA/ACC <https://www.aafp.org/pubs/afp/issues/2016/0715/p170.html#:~:text=The%2014%2Dpoint%20guideline%20includes,previous%20cardiac%20testing%3B%20family%20history>
- Sports Medicine <https://sportsmedicine-open.springeropen.com/articles/10.1186/s40798-021-00346-2>
- Journal of Athletic Training (JAT) The Inter-Association Task Force for Preventing Sudden Death in Secondary School Athletic Programs <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3718357/>
- Virginia High School League (VHSL) Pre-participation Physical Examination Form: <https://www.vhsl.org/forms/>

Appendix

Developing an Emergency Action Plan (EAP)

Student-athlete safety during athletic competition should be a priority throughout the season. Developing an **Emergency Action Plan (EAP)** is a vital component in achieving this goal. Sound EAPs are the product of a collaborative process involving school administrators, medical professionals (i.e., athletic trainers, physicians), and local EMS and should include the identification of an **Emergency Response Team (ERT)**. In addition, the EAP should be specific to *each* practice or competition venue and reflect the following important considerations related to managing emergencies.

Emergency Personnel

Typically, the first responder to a medical emergency is a member of the sports medicine staff such as a certified athletic trainer or team physician. However, these individuals may not always be present at every athletic practice or competition. In some instances, a coach, sponsor, or school administrator may be the first responder and it is imperative that all potential responders understand their role in managing an emergency. Therefore, the EAP should identify the members of the ERT and clearly outline/identify each person's role and responsibilities. These may include but are not limited to:

- Ensuring the scene is safe and providing immediate care
- Activating EMS
- Retrieving emergency medical equipment
- Directing EMS to the scene

Emergency Communication

Quick communication between members of the ERT is critical to effective management of an emergency. The EAP should identify both primary and secondary communication mechanisms for each venue that allows first responders to contact ERT members and EMS as quickly as possible. The communication system should be reviewed prior to each event and shared with visiting medical professionals prior to/during contests.

Emergency Equipment

Any necessary emergency equipment (e.g., AED, epi-pen, mechanism for rapid cooling) should be available and easily accessible at each venue. The members of the ERT should be familiar with the function and operation of emergency equipment and trained to use it in advance. Emergency equipment should be inspected on a regular basis and the members of the ERT should be well practiced in its use.

Medical Emergency Transportation

Ideally, an ambulance is on-site at high-risk events or as needed given the size/scope of the contest. EMS response time and overall EMS transportation capabilities (e.g., basic or advanced life support) should be considered when determining whether to have an ambulance on-site. If an ambulance is available at the venue, it should be located in a designated, easily accessible location

Venue Directions and Map

The EAP should include detailed directions to the venue, including the street address, cross streets, and landmarks to make the site easier to locate. Ideally, EMS personnel and first responders will meet at the venue to familiarize themselves with its location. Consideration should be given to ambulance entrance/exit points as well as whether or not helicopter transport is a viable option. GPS coordinates can assist a helicopter transport.

**SAMPLE EAP: LOCATION
NAME**

Revised: DATE

ADDRESS:

VENUE DIRECTIONS

Practice field:

Competition field:

<p>VENUE MAP</p>

EMERGENCY PERSONNEL

Practice field: (Listed by name/profession)

Competition field: (Listed by name/profession)

EMERGENCY COMMUNICATION

Practice field: (Include description of communication mechanism and telephone # if applicable)

Competition field: (Include description of communication mechanism and telephone # if applicable)

EMERGENCY EQUIPMENT

Practice field: (Identify the available equipment and its specific location)

Competition field: (Identify the available equipment and its specific location)

ROLE OF FIRST RESPONDERS

1. Who will provide immediate care for the injured/ill student-athlete?
2. Who will activate EMS? (Include specific instructions regarding what to tell the dispatcher)
3. Who will retrieve emergency equipment? (Include specific instructions related to location)
4. Who will direct EMS to the scene? (Include specific instructions, including where to stand, access points, etc.)
5. Who will provide “crowd control?”